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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/523,345	10/11/2005	Anke Althoff	14219-074US1/P2002,0642	5755
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EXAMINER				
KEMMERLE III, RUSSELL J				
ART UNIT		PAPER NUMBER		
1791				
NOTIFICATION DATE		DELIVERY MODE		
07/09/2008		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

### Office Action Summary

**Application No.**

10/523,345

**Applicant(s)**

ALTHOFF ET AL.

**Examiner**

RUSSELL J. KEMMERLE III

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**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 May 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3 and 5-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

#### **DETAILED ACTION**

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

#### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 30 April 2008 has been entered.

#### ***Claim Rejections - 35 USC § 112***

In view of the previous filed amendments the prior rejections under 35 USC § 112, 2<sup>nd</sup> paragraph are withdrawn.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-3 and 5-13 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 as currently amended recites that the second ceramic material have a relative permittivity  $\epsilon_2$  at least two times as high as the

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relative permittivity  $\epsilon_1$  of the first ceramic material, support for such a limitation could not be found in the specification as filed. It is noted that there are disclosures in the specification that provide examples which do meet this limitation, for example claim 6 which states  $7 \leq \epsilon_1 \leq 8.5$  and  $18 \leq \epsilon_2 \leq 22$ , however this does not fully support the entire breadth of the newly added limitation that  $\epsilon_2$  be at least twice as large as  $\epsilon_1$ . If support for this newly added limitation is found in the specification as originally filed but was inadvertently missed the Applicant is invited to point out where it could be found in response to this Office action. Claims 2, 3 and 5-13 are rejected based on their dependence from claim 1.

Claims 1-3 and 5-13 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the general idea of the relative permittivities of a first and second material used to make a ceramic substrate, does not reasonably provide enablement for which materials could be used as suitable for making such a substrate and would also satisfy the permittivity requirements of those claims. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the invention commensurate in scope with these claims. Claims 2, 3, 5 and 7-13 are rejected based on their dependence from claim 1.

In the interest of compact prosecution, the claims will be examined based on the assumption that it can be shown that it was known in the art, at the time of invention, that ceramic substrates could be made using materials having such relative permittivities.

**Deleted:** Use form paragraph 7-31-03-scope of enablement. Claims 1-3 and 5-13 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claims 1 and 6 recite relative permittivities of a first and second material used to make a ceramic substrate, however no guidance is provided regarding which materials could be used as suitable for making such a substrate and would also satisfy the permittivity requirements of those claims. It would require undue experimentation on the part of one of ordinary skill in the art to determine what materials would satisfy both of these requirements, and therefore the claims are not enabled.

Claim Rejections - 35 USC § 102/103

Claims 1, 2, 3 and 5-9 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative under 35 U.S.C. 103(a) as being unpatentable over Herron (US Patent 4,627,160).

Herron discloses a method of making a laminated ceramic substrate where a plurality of ceramic green sheets are laminated together, and subsequently fired. Herron discloses that the firing process involves several heating steps, including preheating to 200°C in a nitrogen environment, further heating to 450°C in a hydrogen/water environment, continuing to 785°C, and finally sintering in a nitrogen environment at 965°C to sinter the substrates (see Examples I and II, Col 5 line 51 – Col 6 line 68). Herron specifically states that in heating to the sintering temperature there is no prior cooling of the sample (Col 6 lines 55-57). It should be noted that all heating steps described above are carried out in an inert atmosphere. Herron further discloses that this heating cycle is effective where the layers of the ceramic substrate are made of different ceramic materials (see, Example 1, Col 5 line 51-Col 6 line 46, specifically Col 6 lines 16-22).

While Herron does not disclose the relative permittivities of the materials used, it is assumed, absent a showing to the contrary, that the materials used in Herron would satisfy the permittivity limitations of claims 1 and 6 in order to be effective for forming a laminated ceramic substrate. In the alternative, it would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to use materials which satisfy the permittivity limitations of claims 1 and 6 in order to form a laminated ceramic

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**Deleted:** (It is correct to assume that the claimed subject matter is enabled by the specification to advance prosecution. However, one can't assume that the materials and permittivities are known for the purposes of a 103 rejection; it is here in the 103 rejection where u need to cite art to show that the claimed materials and permittivities are known; merely assuming it is not enough.)  
**Claim Rejections - 35 USC § 103**

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**Deleted:** that which was known in the art (as described above in the rejection under 35 USC §112, 1<sup>st</sup> paragraph) in view of

**Deleted:** As discussed above, it is assumed that materials having the permittivities recited in claim 1 (as well as claim 6) are known in the art to be useful in creating layers for producing a ceramic substrate. It would have been obvious to one of ordinary skill in the art, at the time of invention by Applicant, to have used a combination of these layers in forming a single substrate since they were known to be effective for forming a substrate and by combining the materials as different layers in a known manner the electrical and insulative properties could be controlled in order to create a substrate with desired properties.¶

**Deleted:** It would have been obvious to one of ordinary skill in the art, at the time of invention by Applicant, to have used the method of forming and firing a ceramic substrate taught by Herron by using materials known in the art to be effective for forming a ceramic substrate and satisfying the relative permittivity relationships recited in current claims 1 and 6. This would have been obvious because Herron discloses a method for making a ceramic substrate using layers made of multiple materials, and materials were known for forming such substrates which satisfied the relative permittivity relationships of the current invention. It would have been obvious to use these materials in the process of Herron in order to control the electrical and insulative properties in a known manner and create a substrate with desired properties.

substrate since such materials are known in the art and the relative permittivities of the materials used is known to effect how well they operate as an insulator in the structure.

Referring to claims 2 and 3, Herron further discloses that in forming the laminated stack via holes are opened in the ceramic green sheets, and that those holes are filled with an electrically conductive (i.e., metalliferous) paste, and that the paste is also used to form line patterns on the surface of the sheets (Claim 15).

It would be inherent that these layers would possess the relative sintering temperatures as recited in claim 5.

Referring to claims 7 and 8, Herron discloses that between these stratified layers, a metallization layer (i.e., an in line pattern) can be formed (see Claim 15).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over that which was known in the art (as described above in the rejection under 35 USC §112, 1<sup>st</sup> paragraph) in view of Herron and Nakatani (US Patent 5,252,519).

The known prior art and Herron are relied upon as discussed above. Heron teaches that the electrically conductive paste to be used be a copper compound, and does not teach the use of a silver or silver-palladium containing paste.

Nakatani discloses a method for making a stacked ceramic substrate substantially similar to that of Herron. Nakatani discloses that the metal conductor paste used could include, among others, a silver-palladium mixture (Col 1 lines 26-28).

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant to have modified the method of Herron and the known prior art as discussed above by using a silver-palladium paste as the metallic conductor as taught

by Nakatani instead of the copper compound taught by Herron. This would have been obvious because Nakatani discloses that such a paste is effective as a material for such use, and the advantageous electrical properties of silver-palladium are well known to those in the art.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over that which was known in the art (as described above in the rejection under 35 USC §112, 1<sup>st</sup> paragraph) in view of Herron and Harada (US Published Application 2001/0,022,416)

The known prior art and Herron are relied upon as discussed above but do not teach that the heating process occurs in air.

Harada discloses a method of making a ceramic substrate, substantially similar to that of Herron. Harada further teaches that the heating processes for debinding and sintering are carried out in air (Page 3 paragraph 45) (it is assumed that since no firing environment is described that an air environment is used, since any other special environment would be affirmatively disclosed).

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the method taught by Herron and the known prior art of firing the ceramic substrate in an inert environment by firing in air as taught by Harada. This would be obvious because Harada discloses that such an environment is effective for firing, and an air environment is cheaper and easier to achieve than an inert environment since nothing has to be added to the firing environment.

Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over that which was known in the art (as described above in the rejection under 35 USC § 112, 1<sup>st</sup> paragraph) in view of Herron, Harada and Tamhankar (US Patent 5,230,846)

The known prior art, Herron and Harada are relied upon as discussed above, but fail to teach that during debinding the environment is switched from inert to air (specifically the special case as recited in claim 13), or the firing cycle recited in claim 12).

Herron discloses the benefits of debinding in an inert environment, while Harada discloses the benefits of sintering in an air environment (as discussed above). However, they do not discuss starting with an inert environment of Herron, and switching to the air environment of Harada, specifically performing this switch during a reduction in the temperature from the maximum debinding temperature to a lower temperature that is equal to or greater than the starting debinding temperature.

Tamhankar discloses a method of firing a ceramic substrate substantially similar to that of Herron and Harada. Tamhankar discloses that during the firing cycle a first temperature is reached where debinding begins ( $T_{E1}$ , around 200°C), firing and debinding is then continued up to 500°C in a nitrogen/oxygen/water vapor environment. After a hold at 500°C ( $T_{E2}$ ), the temperature is reduced to 485°C ( $T_{E1}$ ) while the firing environment is changed, during this time the environment is nitrogen/hydrogen/water vapor. Firing is then continued (with the temperature never dropping below  $T_{E1}$ , 200°C) to a sintering temperature in a nitrogen/water vapor environment (Fig 1).



It would have been obvious to one of ordinary skill in the art to modify the method taught by Herron of firing in an inert environment, by changing the environment after debinding to an air environment, since as taught by Harada an inert environment is not required after the debinding is completed and an air environment would be cheaper and easier to fire it. It would be further obvious that the change in environment could be accomplished by the method taught by Tamhankar, which teaches an effective method of transitioning from one environment to another during firing without a substantial reduction in temperature at any point during the firing cycle.

#### ***Response to Arguments***

Applicant's arguments with respect to claims 1-3 and 5-13 have been considered but are moot in view of the new ground(s) of rejection.

#### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RUSSELL J. KEMMERLE III whose telephone number is (571)272-6509. The examiner can normally be reached on Monday through Thursday, 7:00-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. J. K./

Examiner, Art Unit 1791